

AMENDED CLAIM SET

1. (Currently Amended) A tire noise reducing system comprising:
a wheel rim,
a pneumatic tire mounted on the wheel rim to form an annular tire hollow,
and
a noise damper disposed in the annular tire hollow, wherein
the noise damper is a foamable liquid under use conditions and has a certain volume which changes the cross sectional area of the annular tire hollow irregularly in the circumferential direction during rotating so as to irregularly change the resonant mode and reduce noise
wherein the noise damper is an emulsion of ~~at least one kind of~~ an elastomer and an injection volume of the noise damper is in a range of 0.001 to 0.6 times the volume of the tire hollow, and ratio v_2/v_1 of the foamed volume v_2 to the unfoamed volume v_1 of the noise damper is in a range of from 1.5 to 500.

2. – 8. (Cancelled)

9. (Currently Amended) The tire noise reducing system according to claim 1, which further comprises an apparatus for injecting the foamable liquid damper into the tire hollow, the apparatus comprises:
a container for the foamable liquid damper,

a high-pressure gas source to let the foamable liquid damper from the container, and

a nozzle for discharging a mixture of the liquid damper and high-pressure gas to be injected into the tire hollow.

10. (Currently Amended) The tire noise reducing system according to claim 9, wherein said apparatus comprises:

a passageway for high-pressure gas which extends from the high-pressure gas source to the container and is opened in the lower part of the inside of the container so as to open in the foamable liquid damper, and

a passageway for said mixture of the liquid damper and high-pressure gas which extends from the discharging nozzle into the inside of the container so as to open above the liquid level of the foamable liquid damper.

11. (Currently Amended) The tire noise reducing system according to claim 9, wherein said apparatus comprises:

a spray chamber, in which a spray nozzle and a gas nozzle are disposed, and to which said discharging nozzle is opened,

a passageway for the liquid damper which extends from the spray nozzle into the inside of the container and is opened in the lower part of the container so as to open in the foamable liquid damper, and

said gas nozzle connected to the high-pressure gas source and opened so as to blow high-pressure air against the spray nozzle.

12. (Currently Amended) The tire noise reducing system according to claim 9, wherein

said high-pressure gas source is a liquefied gas,

said container contains the liquid damper and said liquefied gas,

said apparatus comprises a passageway for a mixture of the liquid damper and liquefied gas which extends from said discharging nozzle into the inside of the container and is opened in the lower part of the container.

13. – 15. (Cancelled)

16. (Currently Amended) The tire noise reducing system according to claim 1, wherein said elastomer is one of nitrile butadiene rubber, styrene butadiene rubber, ~~butyl~~ butadiene rubber, natural rubber and isoprene rubber.

17. (Currently Amended) A tire noise reducing system comprising:
a wheel rim,
a pneumatic tire mounted on the wheel rim to form an annular tire hollow,
and
a noise damper disposed in the annular tire hollow, wherein

the noise damper is a foamable liquid under use conditions and has a certain volume which changes the cross sectional area of the annular tire hollow irregularly in the circumferential direction during rotating so as to irregularly change the resonant mode and reduce noise,

wherein the noise damper is a rubber latex and an injection volume of the noise damper is in a range of 0.001 to 0.6 times the volume of the tire hollow, and ratio v_2/v_1 of the foamed volume v_2 to the unfoamed volume v_1 of the noise damper is in a range of from 1.5 to 500, wherein said injection volume is such that when the liquid damper stands in a lower part of the tire hollow, the tire hollow is not fully blocked and a narrow part remains, and said foamed volume is such that the tire hollow has a part closed by the foamed damper.

18. (Cancelled).

19. (Currently Amended) A tire noise reducing system comprising:

a wheel rim,

a pneumatic tire mounted on the wheel rim to form an annular tire hollow,

and

a noise damper disposed in the annular tire hollow, wherein

the noise damper is a foamable liquid under use conditions and has a certain volume which changes the cross sectional area of the annular tire hollow irregularly

in the circumferential direction during rotating so as to irregularly change the resonant mode and reduce noise,

wherein the noise damper is a foamy water solution of at least one kind of surfactant and an injection volume of the noise damper is in a range of 0.001 to 0.6 times the volume of the tire hollow, and ratio v_2/v_1 of the foamed volume v_2 to the unfoamed volume v_1 of the noise damper is in a range of from 1.5 to 500, wherein said injection volume is such that when the liquid damper stands in a lower part of the tire hollow, the tire hollow is not fully blocked and a narrow part remains, and said foamed volume is such that the tire hollow has a part closed by the foamed damper.

20. (Currently Amended) A tire noise reducing system comprising:

a wheel rim,

a pneumatic tire mounted on the wheel rim to form an annular tire hollow,

and

a noise damper disposed in the annular tire hollow, wherein

the noise damper is a foamable liquid under use conditions and has a certain volume which changes the cross sectional area of the annular tire hollow irregularly in the circumferential direction during rotating so as to irregularly change the resonant mode and reduce noise,

wherein the noise damper is a foamy water solution of ~~at least one kind of~~ a surfactant and includes a foam stabilizer and an injection volume of the noise

damper is in a range of 0.001 to 0.6 times the volume of the tire hollow, and ratio v_2/v_1 of the foamed volume v_2 to the unfoamed volume v_1 of the noise damper is in a range of from 1.5 to 500, wherein said injection volume is such that when the liquid damper stands in a lower part of the tire hollow, the tire hollow is not fully blocked and a narrow part remains, and said foamed volume is such that the tire hollow has a part closed by the foamed damper.

21. (Currently Amended) The tire noise reducing system according to claim 20, wherein said foam stabilizer is ~~at least one kind of~~ a protein selected from the group consisting of amides, hydroxylammonium, amine oxide, fatty acid polyhydric alcohol ester and albumin.

22. (Currently Amended) The tire noise reducing system according to claim 20, wherein said foam stabilizer is ~~at least one of~~ hydrophilic macromolecular substances.

23. (Currently Amended) The tire noise reducing system according to claim 17, which further comprises an apparatus for injecting the foamable liquid damper into the tire hollow, the apparatus comprises:

a container for the foamable liquid damper,

a high-pressure gas source to let the foamable liquid damper from the container, and

a nozzle for discharging a mixture of the liquid damper and high-pressure gas to be injected into the tire hollow.

24. (Currently Amended) The tire noise reducing system according to claim 23, wherein said apparatus comprises:

a passageway for high-pressure gas which extends from the high-pressure gas source to the container and is opened in the lower part of the inside of the container so as to open in the foamable liquid damper, and

a passageway for said mixture of the liquid damper and high-pressure gas which extends from the discharging nozzle into the inside of the container so as to open above the liquid level of the foamable liquid damper.

25. (Currently Amended) The tire noise reducing system according to claim 23, wherein said apparatus comprises:

a spray chamber, in which a spray nozzle and a gas nozzle are disposed, and to which said discharging nozzle is opened,

a passageway for the liquid damper which extends from the spray nozzle into the inside of the container and is opened in the lower part of the container so as to open in the foamable liquid damper, and

said gas nozzle connected to the high-pressure gas source and opened so as to blow high-pressure air against the spray nozzle.

26. (Currently Amended) The tire noise reducing system according to claim 23, wherein

said high-pressure gas source is a liquefied gas,

said container contains the liquid damper and said liquefied gas,

said apparatus comprises a passageway for a mixture of the liquid damper and liquefied gas which extends from said discharging nozzle into the inside of the container and is opened in the lower part of the container.

27. (Currently Amended) The tire noise reducing system according to claim 19, which further comprises an apparatus for injecting the foamable liquid damper into the tire hollow, the apparatus comprises:

a container for the foamable liquid damper,

a high-pressure gas source to let the foamable liquid damper from the container, and

a nozzle for discharging a mixture of the liquid damper and high-pressure gas to be injected into the tire hollow.

28. (Currently Amended) The tire noise reducing system according to claim 27, wherein said apparatus comprises:

a passageway for high-pressure gas which extends from the high-pressure gas source to the container and is opened in the lower part of the inside of the container so as to open in the foamable liquid damper, and

a passageway for said mixture of the liquid damper and high-pressure gas which extends from the discharging nozzle into the inside of the container so as to open above the liquid level of the foamable liquid damper.

29. (Currently Amended) The tire noise reducing system according to claim 27, wherein said apparatus comprises:

a spray chamber, in which a spray nozzle and a gas nozzle are disposed, and to which said discharging nozzle is opened,

a passageway for the liquid damper which extends from the spray nozzle into the inside of the container and is opened in the lower part of the container so as to open in the foamable liquid damper, and

said gas nozzle connected to the high-pressure gas source and opened so as to blow high-pressure air against the spray nozzle.

30. (Currently Amended) The tire noise reducing system according to claim 27, wherein

said high-pressure gas source is a liquefied gas,

said container contains the liquid damper and said liquefied gas,

said apparatus comprises a passageway for a mixture of the liquid damper and liquefied gas which extends from said discharging nozzle into the inside of the container and is opened in the lower part of the container.

31. (Currently Amended) The tire noise reducing system according to claim 20, which further comprises an apparatus for injecting the foamable liquid damper into the tire hollow, the apparatus comprises:

a container for the foamable liquid damper,

a high-pressure gas source to let the foamable liquid damper from the container, and

a nozzle for discharging a mixture of the liquid damper and high-pressure gas to be injected into the tire hollow.

32. (Currently Amended) The tire noise reducing system according to claim 31, wherein said apparatus comprises:

a passageway for high-pressure gas which extends from the high-pressure gas source to the container and is opened in the lower part of the inside of the container so as to open in the foamable liquid damper, and

a passageway for said mixture of the liquid damper and high-pressure gas which extends from the discharging nozzle into the inside of the container so as to open above the liquid level of the foamable liquid damper.

33. (Currently Amended) The tire noise reducing system according to claim 31, wherein said apparatus comprises:

a spray chamber, in which a spray nozzle and a gas nozzle are disposed, and to which said discharging nozzle is opened,

a passageway for the liquid damper which extends from the spray nozzle into the inside of the container and is opened in the lower part of the container so as to open in the foamable liquid damper, and

said gas nozzle connected to the high-pressure gas source and opened so as to blow high-pressure air against the spray nozzle.

34. (Currently Amended) The tire noise reducing system according to claim 31, wherein

said high-pressure gas source is a liquefied gas,

said container contains the liquid damper and said liquefied gas,

said apparatus comprises a passageway for a mixture of the liquid damper and liquefied gas which extends from said discharging nozzle into the inside of the container and is opened in the lower part of the container.